

We claim:

1. A fixation element for an implantable microphone, wherein the fixation element comprises an essentially cylindrical portion adapted to be inserted into a bore which crosses a wall of the auditory canal of a user, said cylindrical portion, at least in an implanted state of the fixation element, surrounding an outer circumferential portion of a housing part of the microphone, which housing part is provided with a sound receiving member, wherein said cylindrical portion includes at least one elastic region of increased diameter, said elastic region contacting, in the implanted state of the fixation element, a wall of said bore and providing, by elastic restoring forces, for a friction which is sufficiently high to fix said cylindrical portion in at least one of the two axial directions of said bore.
2. The fixation element as claimed in claim 1, wherein said region of increased diameter is defined by at least one sealing member which is adapted to sealingly contact the wall of the bore upon said cylindrical portion having been inserted into the bore.
3. The fixation element as claimed in claim 2, comprising at least two of such sealing members which are axially spaced from each other.
4. The fixation element as claimed in claim 2, wherein the restoring forces of the at least one sealing member are sufficient to prevent movement of the fixation element towards the side of the wall of the auditory canal remote from the skin of the auditory canal.
5. The fixation element as claimed in claim 4, wherein the outer circumference of the at least one sealing member, when disposed outside of said bore, is larger than the inner circumference of said bore.
6. The fixation element as claimed in claim 2, wherein the at least one sealing member is a sealing lip.

7. The fixation element as claimed in claim 6, wherein the at least one sealing lip is adapted to fold in the direction of the side remote from the skin of the auditory canal when the cylindrical portion is inserted into the bore.
8. The fixation element as claimed in claim 2, wherein the at least one sealing member, at the side thereof facing the skin of the auditory canal, is tapered towards the skin of the auditory canal.
9. The fixation element as claimed in claim 3, wherein a first one of said sealing members is disposed at the end of the cylindrical portion which, in the implanted state, faces the skin of the auditory canal.
10. The fixation element as claimed in claim 9, comprising a pair of sealing members wherein a second one of said sealing members is axially spaced from said first sealing member so as to contact, in the implanted state, the wall of the bore near the end of the bore remote from the skin of the auditory canal.
11. The fixation element as claimed in claim 2, wherein the cylindrical portion is connected to a flange portion of increased diameter, said flange portion, in the implanted state, contacting the side of the wall of the auditory canal remote from the skin of the auditory canal.
12. The fixation element as claimed in claim 1, wherein the cylindrical portion is provided, in a central region thereof, with a circumferentially extending bulging which, in the implanted state of the fixation element, is adapted to engage a correspondingly circumferentially extending recess in the wall of the bore.
13. The fixation element as claimed in claim 12, wherein the engagement of the bulging with the recess provides for fixation of the microphone.
14. The fixation element as claimed in claim 12, wherein the bulging is bead-shaped.
15. The fixation element as claimed in claim 12, wherein the cylindrical portion is connected to a flange portion which is adapted to contact, in the implanted state,

the side of the wall of the auditory canal remote from the skin of the auditory canal.

16. The fixation element as claimed in claim 1, wherein the cylindrical portion is provided at one end thereof with a circumferentially extending, elastic, lip member which, in the implanted state of the fixation element, is adapted to rest in a chamfer provided at the end of the bore facing the skin of the auditory canal, the lip member being structured so that elastic restoring forces acting thereon are sufficient to prevent the fixation element from moving in the direction of the side of the wall of the auditory canal which is remote from the skin of the auditory canal.
17. The fixation element as claimed in claim 16, wherein the lip member projects rearwardly with respect to the direction of introduction of the cylindrical portion into the bore.
18. The fixation element as claimed in claim 17, wherein the outer diameter of the cylindrical portion is reduced in the region adjacent to the lip member to facilitate folding back of the lip member during introduction into the bore.
19. The fixation element as claimed in claim 16, wherein the cylindrical portion is provided at the other end thereof with a flange member which, in the implanted state, contacts the side of the wall of the auditory canal which is remote from the skin of the auditory canal.
20. The fixation element as claimed in claim 19, wherein the cylindrical portion is defined by a sleeve portion of a fixing member, and wherein a stud of a main member is adapted to be inserted into said sleeve portion, said stud enclosing the housing part which is provided with the sound receiving member.
21. The fixation element as claimed in claim 20, wherein the fixing member is designed for introduction into the bore from the side remote from the wall of the auditory canal.

22. The fixation element as claimed in claim 20, wherein the inner diameter of the sleeve portion increases in the direction of both ends of the sleeve portion.
23. The fixation element as claimed in claim 22, wherein the inner side of the sleeve portion is conical at both end regions thereof.
24. The fixation element as claimed in claim 23, wherein the conical regions meet each other in the central region of the sleeve portion.
25. The fixation element as claimed in claim 20, wherein the fixing member is reinforced by a circumferentially extending elastic angle member which extends in both the sleeve portion and the flange member.
26. A fixation element for an implantable microphone, wherein the fixation element comprises an essentially cylindrical portion adapted to be inserted into a bore which crosses a wall of the auditory canal of a user, said cylindrical portion surrounding an outer circumferential portion of a housing part of the microphone, which housing part is provided with a sound receiving member, the ends of said cylindrical portion each being provided with a flange member which, in the implanted state of the fixation element, contact one side each of the wall of the auditory canal, and wherein said cylindrical portion is provided at the outer circumference thereof with axially extending protruding web elements of elastic material which, upon insertion of the cylindrical portion into the bore, contact the wall of the bore under the influence of elastic restoring forces.
27. The fixation element as claimed in claim 26, wherein the protruding web elements are structured so that the restoring forces are sufficient to provide for a fixation of the microphone.
28. The fixation element as claimed in claim 26, wherein the outer diameter of the cylindrical portion, in the region of the protruding web elements and when disposed outside of said bore, is larger than the inner circumference of the bore.

29. The fixation element as claimed in claim 26, wherein the protruding web elements are equally spaced from each other in the circumferential direction of the cylindrical portion.
30. The fixation element as claimed in claim 29, wherein the protruding web elements provide for an undulating contour in circumferential direction.
31. The fixation element as claimed in claim 26, wherein the protruding web elements are provided with slots.
32. The fixation element as claimed in claim 31, wherein the slots are approximately V-shaped or U-shaped in axial direction.
33. The fixation element as claimed in claim 31, wherein each of the protruding web elements is provided with a plurality of slots which are axially displaced relative to each other.
34. A fixation element for an implantable microphone, said fixation element comprising first and second members, wherein said first member has a stud adapted for insertion into a bore which crosses a wall of the auditory canal of a user, wherein said stud has a first free end and an opposite second end and encloses a housing part of the microphone at the outer circumference thereof, which housing part is provided with a sound receiving member, and wherein said second member comprises a first flange portion and a sleeve portion, said sleeve portion having opposite first and second ends and being adapted to be slipped, starting with the first end thereof, over said first end of said stud and to be engaged with the stud for preventing at least relative axial movement between the stud and the sleeve portion, and said first flange portion being provided at the second end of the sleeve portion and being adapted to engage, in the implanted state of the fixation element, the side of the wall of the auditory canal facing the skin of the auditory canal.
35. The fixation element as claimed in claim 34, wherein a flange portion is provided at the second end of the stud, said flange portion being adapted to contact, in the

implanted state of the fixation element, the side of the wall of the auditory canal remote from the skin of the auditory canal.

36. The fixation element as claimed in claim 34, wherein the sleeve portion is elastic in radial direction and is adapted to be expanded by introduction of the stud into the sleeve portion, and wherein elastic restoring forces of the expanded sleeve portion provide for said engagement between the sleeve portion and the stud.
37. The fixation element as claimed in claim 36, wherein the sleeve portion is provided with circumferentially spaced slots which start from said first end and which extend in axial direction.
38. The fixation element as claimed in claim 36, wherein the sleeve portion is provided in a central region thereof with a nose which extends in circumferential direction on the inner side of the sleeve portion and which, in the implanted state of the fixation element, contacts the outer circumference of the stud to provide for said engagement between the sleeve portion and the stud.
39. The fixation element as claimed in claim 34, comprising locking means for providing said engagement between the sleeve portion and the stud.
40. The fixation element as claimed in claim 39, wherein the sleeve portion is provided at the inner side thereof with a circumferentially extending recess, and wherein the stud is provided at the outer circumference thereof with a circumferentially extending bulging which, in the implanted state of the fixation element, extends into said recess.
41. The fixation element as claimed in claim 39, wherein the stud is provided at the outer circumference thereof with a circumferentially extending recess, and wherein the sleeve portion is provided at the inner side thereof with a circumferentially extending bulging which, in the implanted state of the fixation element, extends into said recess.
42. The fixation element as claimed in claim 39, wherein the inner diameter of the sleeve portion increases toward said one end thereof.

43. The fixation element as claimed in claim 34, wherein a second flange portion is provided at said first end of said sleeve portion, said second flange portion being adapted to contact, in the implanted state of the fixation element, the side of the wall of the auditory canal remote from the skin of the auditory canal.
44. The fixation element as claimed in claim 43, wherein the first flange portion is comprised of a plurality of circumferentially spaced holding tongues.
45. The fixation element as claimed in claim 43, wherein the second flange portion is comprised of a plurality of circumferentially spaced holding tongues.
46. The fixation element as claimed in claim 43, wherein the stud comprises a conical section the diameter of which increases toward the second end of the stud.
47. A fixation element for an implantable microphone, wherein the fixation element comprises a cylindrical portion adapted to be inserted into a bore which crosses a wall of the auditory canal of a user, said cylindrical portion surrounding an outer circumferential portion of a housing part of the microphone, which housing part is provided with a sound receiving member, wherein said cylindrical portion is provided at a first end thereof with a first flange portion which, in the implanted state of the fixation element, contacts a side of the wall of the auditory canal facing the skin of the auditory canal, wherein said cylindrical portion is provided with a second flange portion which, in the implanted state of the fixation element, contacts a side of the wall of the auditory canal remote from the skin of the auditory canal, wherein said first flange portion is comprised of a plurality of circumferentially spaced elastic first holding tongues, wherein first recesses are provided in the outer circumference of the cylindrical portion, and wherein said first holding tongues are adapted to be folded towards and received by said first recesses to facilitate introduction of the cylindrical portion into said bore.
48. The fixation element as claimed in claim 47, wherein the second flange portion is elastic.

49. The fixation element as claimed in claim 48, wherein the second flange portion is comprised of a plurality of circumferentially spaced elastic second holding tongues, wherein second recesses are provided in the outer circumference of the cylindrical portion, and wherein said second holding tongues are adapted to be folded towards and received by said second recesses.
50. The fixation element as claimed in claim 49, wherein the first and second holding tongues are offset relative to each other in circumferential direction.
51. The fixation element as claimed in claim 47, wherein the first holding tongues are equally spaced from each other in circumferential direction.
52. The fixation element as claimed in claim 49, wherein the second holding tongues are equally spaced from each other in circumferential direction.
53. A fixation element for an implantable microphone, wherein the fixation element comprises a stud adapted to be inserted into a bore which crosses a wall of the auditory canal of a user, said cylindrical portion surrounding an outer circumferential portion of a housing part of the microphone, which housing part is provided with a sound receiving member, wherein said stud is provided at one end thereof with lamellas which are distributed in circumferential direction of the stud, wherein said lamellas have one end thereof pivotally connected to the circumference of the stud, and wherein said lamellas, in the implanted state of the fixation element, contact a side of the wall of the auditory canal facing the skin of the auditory canal.
54. The fixation element as claimed in claim 53, wherein the lamellas are connected to the stud by a wire loop which extends around the stud.
55. The fixation element as claimed in claim 53, wherein the lamellas are biased toward a position in which they contact the side of the wall of the auditory canal facing the skin of the auditory canal.
56. The fixation element as claimed in claim 53, wherein the lamellas are equally spaced in circumferential direction.



57. The fixation element as claimed in claim 56, wherein the lamellas, in the state in which they contact the side of the wall of the auditory canal facing the skin of the auditory canal, define a substantially flat compound.
58. The fixation element as claimed in claim 57, wherein the lamellas, in the state in which they contact the side of the wall of the auditory canal facing the skin of the auditory canal, overlap each other in the manner of tiles.
59. The fixation element as claimed in claim 53, wherein the lamellas are made of biocompatible metal.
60. The fixation element as claimed in claim 53, wherein a flange portion is provided at an end of the stud remote from the lamellas, said flange portion being adapted to contact, in the implanted state of the fixation element, the side of the wall of the auditory canal remote from the skin of the auditory canal.